II. CLAIM AMENDMENTS

1. (Original) A method of minimizing thermal reactor temperature overshoot and stabilization time during a boat push comprising the steps of:

reducing a temperature setpoint to a minimum value, and

as the temperature in the reactor begins to increase during the boat push, ramping the temperature back to an original temperature setpoint.

2. (Original) The method of claim 1 wherein the step of reducing the setpoint minimizes temperature overshoots in the reactor caused by an addition of heat due to an introduction of a load of wafers into a processing chamber.

3. (Original) The method of claim 1 wherein the step of ramping comprises ramping the reactor from the reduced setpoint to the original setpoint, wherein during the ramping powers of all heating zones of the reactor are not in saturation.

4. (Original) The method of claim 1 wherein an observed minimum temperature is not declared the minimum temperature value until a period of time elapses where actual temperature values are above an observed minimum temperature.

5. (Original) The method of claim 1 further comprising a time delay after initiating the boat push mode before reducing the temperature setpoint minimum value in order to allow enough time to elapse before the introduction of the wafer load effects the temperature in the processing chamber.

6. (Original) The method of claim 1 wherein prior to reaching the minimum value, a setpoint temperature is reduced by an amount that equals a value of a largest temperature overshoot.

7. (Original) The method of claim 1 further comprising the step of selecting a ramping mode to be used to ramp the temperature back to the original setpoint.

8. (Original) The method of claim 1 further comprising ramping a temperature of a respective zone in the reactor back to the original setpoint of the zone after the zone finds its own minimum.

9. (Original) The method of claim 1 further comprising ramping the temperature back to the original setpoint after any zone in the reactor finds minimum.

10. (Original) The method of claim 1 further comprising ramping the temperature of each zone in the reactor back to the original setpoint only after all zones in the reactor have reached a minimum.

11. (Original) The method of claim 1 further comprising ramping all zones of the reactor back to the original setpoint from a minimum value of minimum values reached for all zones of the reactor.

12. (Original) The method of claim 1 wherein the step of reducing a temperature setpoint to a minimum value comprises looking for a minimum temperature in each zone of the reactor after initiating the boat push.

13. (Original) A method for controlling temperature overshoot during a boat push in a thermal reactor comprising:

activating a boat push control mode;

waiting a predetermined period of time;

reducing current setpoints for each zone;

monitoring each zone of the thermal reactor to determine a minimum temperature for each zone;

ramping the reduced current setpoints back to an original setpoint.

14. (Original) The method of claim 13 wherein the step of ramping comprises implementing independent ramping wherein each zone independently ramps to a current setpoint for the zone after each respective zone finds its minimum.

15. (Original) The method of claim 13 wherein the step of ramping comprises multiple reference ramping wherein all of the zones ramp up to their original setpoint only when all the zones have found their minimum.

16. (Original) The method of claim 13 wherein the step of ramping comprises single reference ramping wherein all of the zones ramp up to their original setpoint only after a minimum of all of the minimums for each zone is reached.

17. (Original) The method of claim 13 further comprising enabling a smoothing mode at a predetermined temperature level prior to reaching the original setpoint in order to reduce temperature overshoot at the original setpoint.

18. (Original) A system for minimizing temperature overshoot in a reactor for heating and cooling a load of wafers to a desired processing temperature during introduction of a material into the reactor comprising:

a boat push controller adapted to receive setpoint information from a user and provide an optimized setpoint trajectory for temperature control in the reactor;

a profile controller adapted to receive the optimized setpoint trajectory from the boat push controller and determine a temperature setpoint based upon a difference between the desired and observed temperature of a profile thermocouple in the reactor; and

a spike controller adapted to receive the temperature setpoint from the profile controller and to apply power to a heating element of the reactor based upon difference between the desired and observed temperature of a spike thermocouple in the reactor.

19. (Original) A control system for controlling temperature overshoot in a thermal reactor comprising:

a process sequencing system adapted to accept and execute a process sequence entered by a user, the process sequence including temperature setpoint values;

a temperature system for temperature control in accordance with the process sequence, the temperature system adapted to receive temperature control parameters including the setpoints entered by the user, the temperature system further adapted to:

reduce a current temperature setpoint to a minimum value to reduce heat buildup in the reactor during an idle mode; and

ramp the reactor temperature from the minimum value to an original setpoint value after a predetermined period.

20. (Original) The control system of claim 19 wherein the current setpoint is determined by the process sequencing system.

21. (Original) The control system of claim 19 wherein the original setpoint is determined by the process recipe.

22. (Original) The control system of claim 19 wherein each minimum value is found by the process sequencing system by monitoring each zone of the reactor for a minimum temperature value reached when temperature setpoints are reduced.

23. (Original) The control system of claim 19 further comprising at least one profile temperature sensor adapted to feed profile temperature data to the temperature system to allow the temperature system to determine a profile temperature error and use the error to calculate a spike temperature setpoint; and

at least one spike temperature sensor adapted to provide spike temperature data to the system to determine a spike temperature error that is used by the system to calculate a power to the reactor for temperature control.